88-120

WATER FACT SHEET

U.S. GEOLOGICAL SURVEY, DEPARTMENT OF THE INTERIOR

U.S. GEOLOGICAL SURVEY GROUND-WATER STUDIES IN VERMONT

GROUND-WATER ISSUES

Ground water is the primary source of water supply for about 54 percent of the 511,000 residents of Vermont. There are 527 public-supply wells, about 1,500 public wells operated by commercial establishments such as restaurants and motels, and about 50,000 private wells in the State. Public systems serve 113,000 people; private and rural systems serve 162,000 people. Of the total quantity of ground water used, about 77 percent is used for domestic and commercial purposes, 11 percent for industry and mining, and 12 percent for agriculture. The major issues related to ground water in Vermont are:

- Ground-water quality,
- Contamination of ground water by waste disposal, and
- Management of ground-water quality by land-use controls in critical areas.

U.S. GEOLOGICAL SURVEY PROGRAMS

The U.S. Geological Survey (USGS), established in 1879, is the principal source of scientific and technical expertise in the earth sciences within the Federal government. USGS activities include research and services in the fields of geology, hydrology, and cartography. The mission of the Water Resources Division of the USGS is to develop and disseminate information on the Nation's water resources. The activities of the Water Resources Division in Vermont are carried out by scientists, technicians, and support staff in offices in Bow, N.H., and Montpelier, Vt.

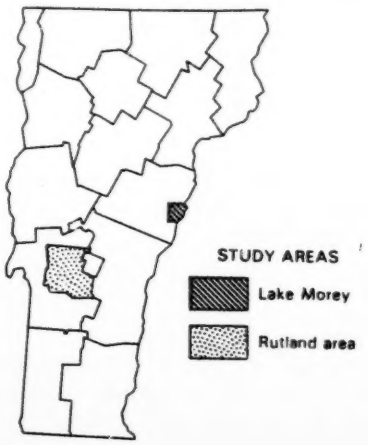
Stations for the collection of hydrologic data are maintained at selected locations throughout Vermont, and constitute a water-resources-data network for obtaining records on stream discharge and stage, reservoir and lake storage, ground-water levels, well and spring discharge, and the quality of surface and ground water. Water-resources data are stored in the USGS National Water Data Storage and Retrieval System. These data are used by water planners and managers involved in making decisions that affect the use and conservation of Vermont's water resources.

During 1987, the USGS, in cooperation with various State agencies, maintained a network of about 15 observation wells in Vermont for monitoring fluctuations in water levels. Water-level measurements from wells are used to monitor ground-water trends; however, they must be integrated with other observations and ground-water investigations to have relevance and usefulness.

The USGS has conducted 17 hydrologic investigations in Vermont that deal with ground-water resources. During 1987, the USGS, in cooperation with the Vermont Agency of Natural Resources, studied geohydrologic conditions and water use of the Connecticut River valley aquifer in southeastern Vermont. This investigation provides information needed by Vermont's water planners and managers to answer hydrologic questions that are specific to the State's ground-water issues. The following sections discuss two examples of ground-water studies by the USGS that were designed to address specific ground-water issues in Vermont.

Water Quality of Lake Morey

Lake Morey, located in eastern Vermont, is a highly valued resource that attracts and supports recreational fishing, swimming, boating, and other resort operations that depend on good water-quality conditions in the lake. Water-quality problems, such as excessive algae and plant growth, have interfered with these uses. Information on ground-water inflow to the lake, phosphorus and nitrate concentrations in ground water, and an estimate of the total lake water budget were needed by State and local officials to determine the most effective strategy to improve water quality. From 1980 through 1984, the USGS, in cooperation with the Vermont Agency of Natural Resources, studied ground- and surface-water conditions around the lake. As part of this study, surface-water inflow to the lake,



surface-water outflow from the lake, and lake stage were recorded continuously. Ground-water discharge to the lake was estimated from data gathered from 47 wells that were installed for the study, from seismic refraction profiles of subsurface deposits, and from seepage meters installed around the lake. All of the wells were sampled for common inorganic constituents at least twice during the study, and water-quality samples also were obtained from the lake. The results of this study have been used by State water planners and managers to determine the optimum management strategies for improving water quality.

Ground-water Resources of the Rutland Area

The USGS has studied ground-water resources at various places throughout Vermont. A study conducted in cooperation with the Vermont Agency of Natural Resources near the city of Rutland in central Vermont is typical of these investigations. The purposes of the investigation were to determine the location and potential yield of unconsolidated aquifers, to evaluate the yield of bedrock aquifers, and to characterize ground-water quality. As part of this investigation, the USGS reviewed all available geohydrologic information and mapped surficial geologic deposits. About 900 wells and borings were located and inventoried. The chemical quality of ground water was determined from samples taken at 71 wells. Aerial photographs were interpreted to assist in mapping surficial geologic deposits and bedrock fracture traces. Seismic-refraction data were collected at 51 locations, and 12 test holes were drilled in unconsolidated deposits. Maps that show the location, extent, and relative permeability of aquifers were prepared at a scale of 1:48,000. State, local, and regional water managers and planners have used this information to determine optimum locations for new wells and to protect ground-water quality near existing wells.

GROUND-WATER MANAGEMENT

The USGS has been involved since 1965 in cooperative ground-water studies with State agencies in Vermont to provide information needed for ground-water management. The principal State agencies responsible for ground-water management are the Vermont Agency of Natural Resources' Department of Environmental Conservation, the Vermont Department of Health, and the Vermont Department of Agriculture. The Agency of Natural Resources is responsible for protecting and identifying the State's ground-water resources. The Department of Health is responsible for protecting and monitoring the quality of drinking-water supplies. The Department of Agriculture is responsible for controlling the use of pesticides. A ground-water coordinating committee synchronizes agency programs in a comprehensive statewide effort. Several Regional Planning Commissioners cooperate with State agencies in establishing local ground-water protection plans and ordinances.

SELECTED REFERENCES

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U.S. Geological Survey, 1984, National water summary 1983—Hydrologic events and issues: U.S. Geological Survey Water-Supply Paper 2250, 243 p.

_____1985, National water summary 1984—Hydrologic events, selected water-quality trends, and ground-water resources: U.S. Geological Survey Water-Supply Paper 2275, 467 p.

Willey, R.E., and Butterfield, David, 1983, Ground-water resources of the Rutland area, Vermont: U.S. Geological Survey Water-Resources Investigations Report 82-4057, 38 p.

Information on technical reports and data related to ground water in Vermont can be obtained from:

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